GeoDesign: Finding Perimeter and Area

Brief Overview:

Perimeter and area are essential components for measurement and geometry. By completing activities relative to finding perimeter and area students will be able to make connections to both mathematical and real life applications. Because students often struggle with understanding concepts of measurement, they sometimes experience difficulty when being asked to use measurement tools, determine spatial accuracy, use formulas, and understand concepts as they relate to measurement. This unit will review linear measurement, teach area of polygons (two-dimensional figures), and will prepare students for the study of volume (three-dimensional figures) using hands-on activities that require the use of manipulatives.

NCTM Content Standard/National Science Education Standard:

Apply appropriate techniques, tools, and formulas to determine measurements

- **Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.**

Grade/Level:

Grades 4-6

Duration/Length:

3 days (90 minutes each day)

Student Outcomes:

Students will**:**

- **Use a grid and apply measurement formulas in order to determine perimeter of any closed figure (polygon).**
- **Apply measurement formulas in order to determine areas of rectangles and squares.**
- **Apply measurement formulas in order to determine the area of a triangle.**

Materials and Resources:

Lesson 1

- **Student Geoboards (with rubber bands)**
- **Teacher Overhead Geoboard**
- **Rulers**

- **Lined Chart Paper**
- **Student Resource 1 – "Formulas for Finding the Perimeter of Polygons"**
- **Student Resource 2 – "Find the Perimeter"**
- **Student Resource 3 – Geoboard Dot Paper**

Lesson 2

- **Tape**
- **Construction paper**
- **Unit blocks**
- **Student Geoboards (with rubber bands)**
- **Teacher Overhead Geoboard**
- **Crayons**
- **Lined Chart Paper**
- **Overhead projector or visualizer**
- **Student Resource 4 – GeoDesign: Finding the Area of Rectangles and Squares**
- **Student Resource 5 – Centimeter grid paper**
- **Student Resource 6 – Geoboard Dot Paper**

Lesson 3

- **Geoboards (with rubber bands)**
- **Scissors**
- **White paper**
- **Crayons**
- **Lined Chart Paper**
- **Student Resource 7 – Warm Up: Find Area of Two Triangles**
- **Student Resource 8 – Exploring Area of Right Triangles**
- **Student Resource 9 – GeoDesign: Finding Area of a Triangle**
- **Student Resource 10 – Centimeter grid paper**
- **Student Resource 11 – Geoboard Dot Paper**

Summative Assessment

- **Student Resource 12 – Brief Constructed Response/Selective Response Perimeter and Area**

Development/Procedures:

Lesson 1

Pre-Assessment

Distribute rulers and instruct students to use their ruler to draw a line segment of each length.

1) 3/8 in. 2) 2-3/4 in. 3) 1-1/2 in. 4) 4-1/4 in. 15) 3-7/8 in.

Launch

"Exploring Perimeter"

- **Instruct students to start at a point along the wall of the classroom, hallway, gymnasium or other pre-determined location. Walk the perimeter of the location.**
- **Stay close to the walls. Walk around the location until you return to your starting point. Count your steps as you travel around the location.**
- **Ask students how many of their steps totaled the perimeter of the location?**
- **Tell students when they are finished to discuss the following questions:**
  - **a) Did everyone count the same number of steps?**
  - **b) Does the perimeter depend upon who is measuring it?**
  - **c) Which of these is the best physical example of perimeter?**
    1. **The tile or carpet that covers the floor.**
    2. **The molding along the base of the wall.**

Teacher Facilitation

"Finding Perimeter"

Key Idea: You can find the distance around any polygon by adding the lengths of its sides.

Vocabulary: Teacher introduces the vocabulary words and records on lined anchor chart paper.

1) Perimeter: The distance around the outside of any polygon.
2) Formula: An equation that states a rule.
3) Polygon: A closed plane figure made up of line segments.

Teach: "How can you find the distance around a shape?"

- Define perimeter.

  1) Write the word perimeter on the board then show it separated into the prefix and the root.

  2) Explain that the word perimeter has two parts. The root word ***meter*** means distance.

  3) Ask students what they think the prefix ***peri-*** means. (Peri- means around.)

  4) Perimeter is the distance around a shape.

  5) Record definition on an anchor chart.

- Explain and model how to find the perimeter of a polygon.

  1) Model how to find the perimeter of a polygon using an Overhead Geoboard.

  2) Demonstrate for students how to count and mark units on the perimeter in order to get an accurate count.

3) Find the perimeter of a polygon by counting the number of units along the length and width from a given starting point to the endpoint.

- Model how to find the perimeter of a square:
  1) Use geoboard to make a square of any size.
  2) Count and mark the number of units around the perimeter of the square.
  3) Use a formula to find the perimeter of the square. Perimeter = s + s + s + s or Perimeter = 4s.

- Model how to find the perimeter of a rectangle:
  1) Use geoboard to make a rectangle of any size.
  2) Count and mark the number of units around the perimeter of the rectangle.
  3) Use a formula to find the perimeter of the rectangle. Perimeter of a Rectangle = $l + l + w + w$ or Perimeter = $2l + 2w$.
  4) Record formulas on an anchor chart.

Student Application

- Use Student Resource 1: "Formulas for Finding the Perimeter of Polygons" to practice using the various formulas for finding perimeter.
- Teacher and students will find the perimeter of a math book and record the results on a graphic organizer.
- Choose three additional objects to measure.
- Apply the formula to find the perimeter.
- Record results on graphic organizers.

Embedded Assessment

Students will complete Student Resource 2 – "Assessment: Find the Perimeter". Students are to find the perimeter of each polygon by labeling all sides and applying a formula.

Reteaching/Extension

Reteaching: (Geoboard Perimeter)

Have students make a 4 x 2 rectangle on their geoboards. Write the formula and the next step on the board. Ask: "What is the length?" (4 units) Ask: "What is the width?" (2 units) Say: "Put these numbers (4 and 2) where the boxes are." Complete the solution with the students. Ask: "What is the perimeter?" (12 units) Repeat with similar problems.

$P = 2l + 2w$

= (2 x ☐) + (2 x☐)

= (2 x 4) + (2 x 2)

= 8 + 4

= 12

Extension: **Distribute geoboards and Student Resource 3 – Geoboard Dot Paper. Instruct students to make as many shapes as they can with a perimeter of 16 units and draw their shapes on the Geoboard Dot Paper.**

Lesson 2

Pre-Assessment

Use the geoboard to make the following plane figures: triangle, square, rectangle, and a polygon of your choice. Find the perimeter of each figure. Record drawings on Student Resource 6 Geoboard Dot Paper.

Launch

"Area and Perimeter"

Activity 1

- **Divide students into groups of two.**
- **Instruct Student 1 to use centimeter grid paper and cut out an 8-by-10 rectangle. Student 2 will cut out a 6-by-5 rectangle.**
- **Tell students that the number of square units inside a figure is called its area. Ask students what are the areas of your rectangles? (80 square cm, 30 square cm)**
- **Label each rectangle with its area. Tape the two rectangles together on construction paper. Ask: "How can you find the area of the new figure?" (Add the areas: 80 square cm + 30 square cm = 110 square cm or 110 cm^2)**
- **Have students copy the new figure on grid paper. Ask: "What two rectangles can you use to find the area of this shape?" (Two possible answers: 15-by-6 and 2-by-10; 8-by-10 and 5-by-6)**

Activity 2

- **What is the total area of two rectangles each with an area of 12 square units? (24 square units)**

Teacher Facilitation

"Areas of Squares and Rectangles"

Key Idea: You can use formulas to find the areas of squares and rectangles.

Vocabulary: Teacher introduces the vocabulary words and records on lined anchor chart paper.

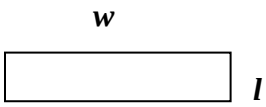
1) Area: The number of square units needed to cover the region inside a figure is its area.
2) Rectangle: A quadrilateral with 4 right angles.
3) Square: A quadrilateral with 4 right angles and all sides the same length.

Teach: "How can you find the areas of squares and rectangles without counting?"

- Review perimeter. Say: "When you measure the distance around a shape, the distance is called its perimeter."
- Define area. Say: "When you measure the area inside a closed plane figure it is called the *area*."
- Compare measuring perimeter and area. Say: "We use different kinds of units to measure perimeter and area. To measure perimeter, the sum of all sides, we use units of length like inches and centimeters. To measure area, the total square units needed to cover the inside of a closed figure, we use units like square inches and square centimeters.
- Model how to find the area of a rectangle:
  1) Use a geoboard to make a rectangle of 3-by-4.
  2) Count the number of square units inside the perimeter. (12 square units)
  3) Use a formula to find the area of the rectangle. Area = length x width
     A = *l* x *w*
     A = 3 x 4
     A = 12 square units or 12 units^2
  4) Record formulas/example on an anchor chart.
- Model how to find the area of a square:
  1) Use a geoboard to make a square of 4-by-4.
  2) Count the number of square units inside the perimeter.
  3) Use a formula to find the area of the square. Area = side x side
     A = s x s
     A = 4 x 4
     A = 16 square units or 16 units ^{2}
  4) Record formulas/example on an anchor chart.
- Emphasize that perimeter is measured in units and area is measured in square units (units^2).

Student Application

1. **Complete Student Resource 4 – "GeoDesign": Finding Area of Rectangles and Squares.**
2. **Before students begin, review the vocabulary and formulas and give directions.**
   - **Review vocabulary and formulas for area: (Refer to vocabulary anchor chart)**

Area of a Rectangle	**Area of a Square**
	
Formula for a Rectangle **Area of a rectangle = length x width** **A = *l* x *w***	**Formula for a Square** **Area of a square = length x width** **A = *l* x *w*** **Area of a square = side x side** **A = *s* x *s*** **A = s^2**

- *Give the directions for Student Resource 4 – "GeoDesign": Finding Area of Rectangles and Squares:*
  1) *<u>Part A</u>: Solve by counting the total number of square units for the castle and apply the formula for area of a rectangle or square.*
  2) *<u>Part B</u>: Use a ruler to create/draw a GeoDesign that uses only squares and rectangles. Solve by counting the total number of square units and apply the formula for area of a rectangle or square for your GeoDesign.*

  Create a title for your drawing.

Embedded Assessment

Exchange student designs on Student Resource 4 – "GeoDesign": Finding Area of Rectangles and Squares with their partners and have each determine the area of their partner's design.

Reteaching/Extension

Reteaching: "Unit Cube Activity"
Use unit cubes to make rectangular or square shapes on Student Resource 5 - Centimeter Grid Paper.

- **Display a floor plan for a room.**
- **Have students imagine that they will put carpet on the floor.**
- **Have students use unit cubes to figure out the size of the room's floor. (They could count the squares in the floor plan.)**
- **Have students apply the formula for area of a rectangle; multiply the length times the width and solve.**

Extension: "Geoboard Activity"

- **Have students make 5 different sized squares and 5 different sized rectangles on their geoboards.**
- **Draw your figures on Student Resource 6 - Geoboard Dot Paper and label your lengths and widths.**
- **Find the total area for all ten figures.**

Lesson 3

Pre-Assessment

Student Resource 7- Find the area of the two triangles.

Launch

Activity #1: **"Exploring Area of a Right Triangle"**

- How are you able to use what you know about area of rectangles in order to find area of right triangles?
- **Students work in pairs:**
  1) **Use your geoboard to make a rectangle.**
  2) **Make two triangles in your rectangle by stretching a rubber band from one corner to the other corner of the rectangle.**
  3) **Check to be sure your two triangles are the same in size.**
  4) **Compare the size of the two triangles to the size of the rectangle?**
  5) **Record your results on Student Resource 8 – Exploring Area of Right Triangles:**

"Exploring Area of a Right Triangle"

Width of the Rectangle (Units)	**Length of the Rectangle (Units)**	**Area for the Rectangle (Units^2)**	**Area for each Triangle (Units^2)**

- Instruct: "From your exploration activity # 1, you discover that if you draw a rectangle and divide it into two triangles that two right triangles are formed and that the area of the right triangles is equal to one half of the area of the rectangle."

Activity # 2: **"Exploring Area of Triangles"**

- Not all triangles are going to be right triangles.
- **You are able to find the area of other types of triangles.**
- **Students work in pairs:**
  1) **Use Student Resource 10 – Centimeter Grid Paper to draw a rectangle.**
  2) **Draw and color in a triangle inside the rectangle.**
  3) **Ensure that the base of the triangle is one of the sides of the rectangle and that the point of the triangle is drawn somewhere on the opposite side of the rectangle.**

4) **Next, cut your rectangle. After, cut out your triangle you drew inside your rectangle. You should have three pieces.**
5) **Place your not shaded portions of your rectangle exactly over the top of your shaded or colored in triangle. The not shaded in area should cover exactly over the top of the colored in triangle.**
6) **Compare the area of the triangle to the area of the rectangle? Explain your findings.**
7) **Inquire as to how students could find the area of any type of triangle.**

- **Instruct: "From your exploration activity # 2, you discover that when you cut out the triangle and then place the not shaded parts of the rest of the rectangle on top of your triangle that they cover the triangle exactly. You can conclude that the area of any triangle is equal to one half the area of its rectangle."**

Activity # 3: **"Exploring Area of Triangles"**

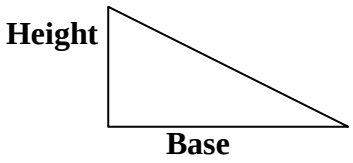
- **Distribute 1 sheet of white paper and scissors to the students.**
- **Fold the piece of paper in half and draw a triangle onto the folded paper.**
- **Use a pair of scissors to cut out the triangle while the paper is still folded. You should end up with two congruent triangles.**
- **Put the two triangles together to form a parallelogram. What fraction of the entire parallelogram does each triangle make?**
- **Say: "We'll find that when we put the two congruent triangles together, it will form a parallelogram. The area of the triangle is equal to one half of the area of the parallelogram that you made."**
- **Say: "Remember that the area of a parallelogram is found by multiplying its base times its height (A = b x h). Therefore, the area of a triangle can be found by finding half of the base times its height."**
-

Teacher Facilitation

Title: "Area of a Triangle"

Key Idea: You can use formulas to find the areas of triangles.
Vocabulary: (Teacher introduces the vocabulary words and records on lined anchor chart paper.)

1) **Area: The number of square units needed to cover the region inside a figure is its area.**
2) **Triangle: A polygon with three sides.**
3) **Base: The bottom of a polygon (triangle) or solid.**
4) **Height: The length of the perpendicular line segment from the vertex to the base of a triangle.**



Teach: "How can you find the area of a triangle without counting?"

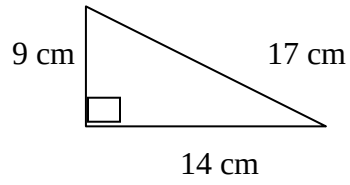
- Explain how to find the area of a triangle.
- Instruct: "In the pre-assessment and exploration activity # 1, you could find the area of a triangle by using grid paper and counting the number of square units. That worked fine if your triangle cuts the little grid squares exactly in half, but what happens if they do not? How would you count the squares exactly?" (Model an example)
- You could draw a rectangle around your triangle and determine your area by counting all squares inside of your rectangle and dividing it in half.
- We also found that if we have a parallelogram and took half of the product of the base and height we could also find the area of a triangle.
- Another way to find the area of a triangle is to use the formula for finding the area of a triangle.

Area of a Triangle = ½ x Base x Height
NOTE: **Since multiplying a number by ½ and dividing by 2 are equal operations, the formula can also be written as:**

$$\mathbf{A = \frac{b \times h}{2}}$$

- Teacher models how to find the area of a triangle.

Example:



Step 1: $\mathbf{A = \frac{b \times h}{2}}$

Step 2: $A = \frac{14 \times 9}{2}$

Step 3: $A = \frac{126}{2}$

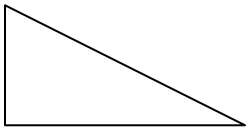
Step 4: $A = 63\ cm^2$

** Be sure to emphasize that area is measured in square units (units²).*

Student Application

- *Complete Student Resource 9 - "GeoDesign": Finding Area of a Triangle*
- *Review the vocabulary and formula for area of a triangle then give directions.*

1. **<u>Area</u>: The number of square units needed to cover the region inside a figure is its area.**
2. **<u>Triangle</u>: A polygon with three sides.**

Area of a Triangle 
Formula: **Area of a Triangle = ½ x Base x Height** $\mathbf{A = \frac{b \times h}{2}}$

- *Give the directions for Student Resource 9 -"Geo-Design": Finding Area of a Triangle:*

  Part A: Solve by measuring the base and height in centimeters in the triangles of the flower and applying the formula for area of a triangle to get the total area of the geo-design.

  Part B: Use a ruler; create/draw a geo-design that uses only "triangles". Solve by measuring the base and height of your triangles in your geo-design and by applying the formula for the area of a triangle. Create a title for your drawing.

Embedded Assessment

Exchange student designs on Student Resource 9 - GeoDesigns "Finding the Area of a Triangle" with their partners and have each determine the area of each others' design.

Reteaching/Extension

- **Reteaching: Geoboard:**
  1. **Use a geoboard and have students make two congruent right triangles together to make a square. Observe a square is made of**

two congruent right triangles. The areas of the right triangles are equal to ½ the area of the square.

2. **Have students make two congruent right triangles together to make a rectangle. Observe a rectangle is made of two congruent right triangles. The areas of the right triangles are equal to ½ the area of the rectangle.**
3. **Have students make two congruent acute triangles together to make a parallelogram. Observe a parallelogram is made of two congruent acute triangles. The areas of the acute triangles are equal to ½ the area of the parallelogram.**
4. **Have students make two congruent obtuse triangles together to make a parallelogram. Observe a parallelogram is made of two congruent obtuse triangles. The areas of the obtuse triangles are equal to ½ the area of the parallelogram.**

- **Extension: Distribute geoboards and Student Resource 11 – Geoboard Dot Paper.**
- **Instruct students to find and draw as many different triangles that they can that have the same area on their geoboards and on their GeoBoard Dot Paper.**

Summative Assessment:

Students are to complete the Brief Constructive Response (BCR) and five Selective Response (SR) questions. Refer to Student Resource 12. See Teacher Resource 12 for an example of an exemplary response.

Appendix A: Student Resources

- **Student Resource 1 – "Formulas for Finding the Perimeter of All Polygons"**
- **Student Resource 2 – "Assessment: Find the Perimeter"**
- **Student Resource 3 – Geoboard Dot Paper**
- **Student Resource 4 – GeoDesign: Finding the Area of Rectangles and Squares**
- **Student Resource 5 – Centimeter Grid Paper**
- **Student Resource 6 – Geoboard Dot Paper**
- **Student Resource 7 – Find Area of Two Triangles**
- **Student Resource 8 – Exploring Area of Right Triangles**
- **Student Resource 9 – GeoDesign: Finding Area of a Triangle**
- **Student Resource 10 – Centimeter Grid Paper**
- **Student Resource 11 – Geoboard Dot Paper**
- **Student Resource 12 – Brief Constructed Response/Selective Response Perimeter and Area**

Appendix B: Teacher Resources

- **Teacher Resource 1 – "Formulas for Finding the Perimeter of All Polygons"**
- **Teacher Resource 2 – "Assessment: Find the Perimeter"**
- **Teacher Resource 3 – Geoboard Dot Paper**
- **Teacher Resource 4 – GeoDesign: Finding the Area of Rectangles and Squares**
- **Teacher Resource 5 – Centimeter Grid Paper**
- **Teacher Resource 6 – Geoboard Dot Paper**
- **Teacher Resource 7 – Find Area of Two Triangles**
- **Teacher Resource 8 – Exploring Area of Right Triangles**
- **Teacher Resource 9 – GeoDesign: Finding Area of a Triangle**
- **Teacher Resource 10 – Centimeter grid paper**
- **Teacher Resource 11 – Geoboard Dot Paper**
- **Teacher Resource 12 – Brief Constructed Response/Selective Response Perimeter and Area**

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Formulas for Finding the Perimeter of Polygons

Item to be Measured	**Perimeter of a Square** ***P = 4s or P = s + s + s + s***	**Perimeter of a Rectangle** ***P = l + l + w+ w or P = 2l + 2w***	**Perimeter of a Polygon** ***P = Sum of all sides***
1. Math Book			

Name_____ Date_____

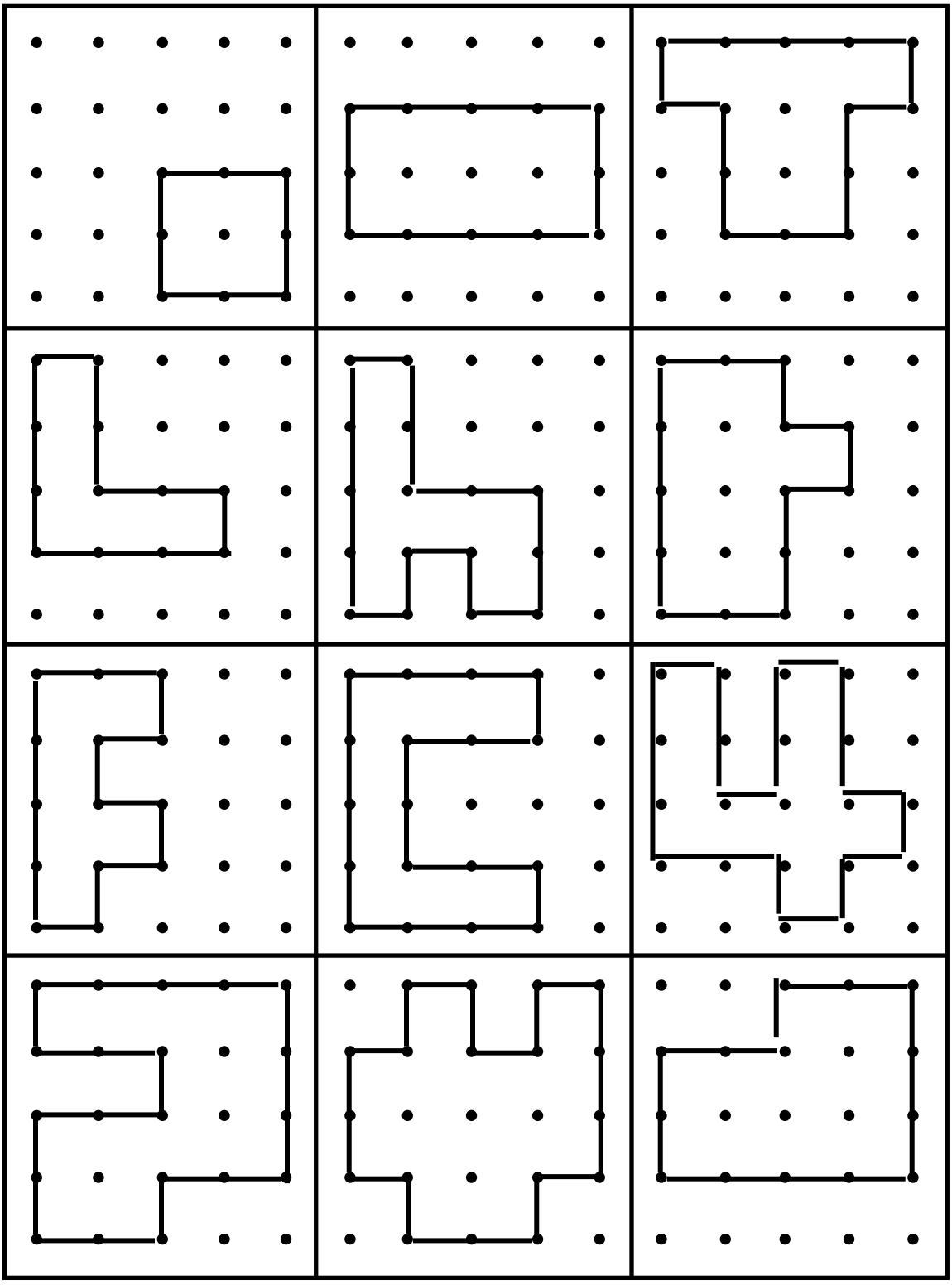
Teacher_____ Subject _____

Name_____ Date_____

Teacher_____ Subject _____

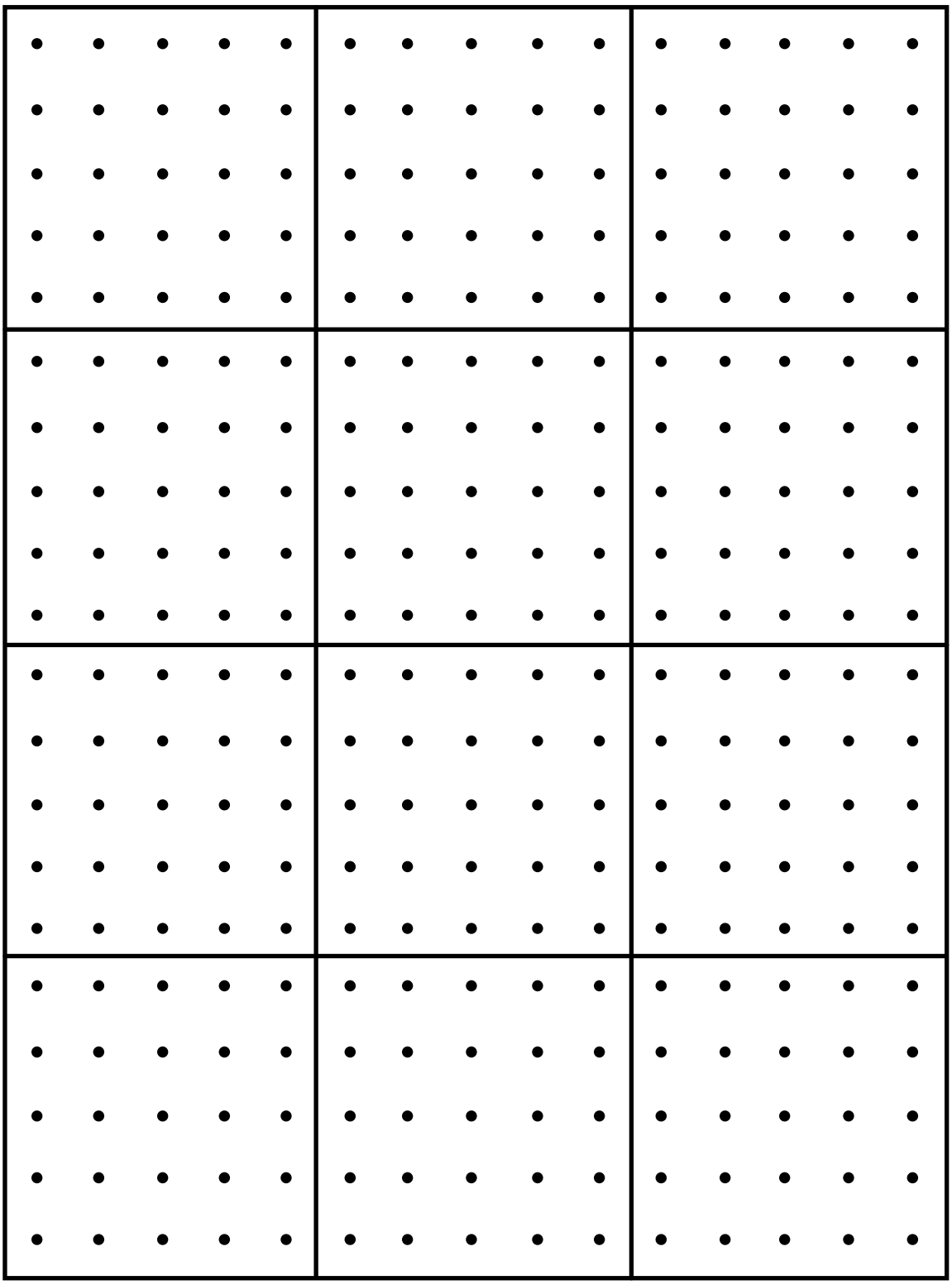
Assessment: Find the Perimeter

Directions: Find the perimeter of each polygon by labeling all sides and applying a formula.



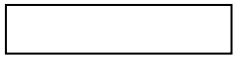
Geoboard Dot Paper

Name: ……..

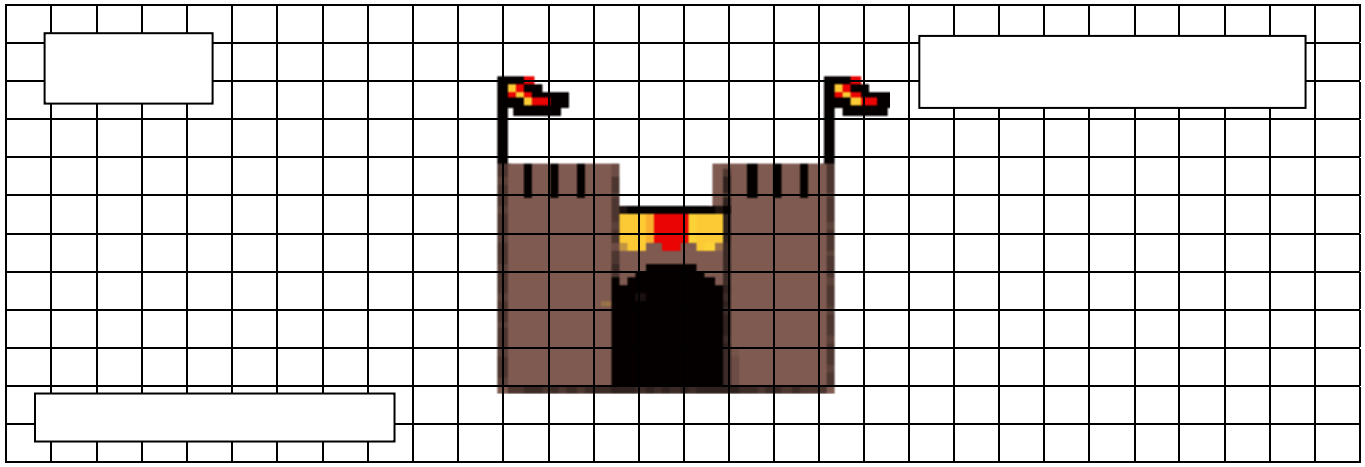


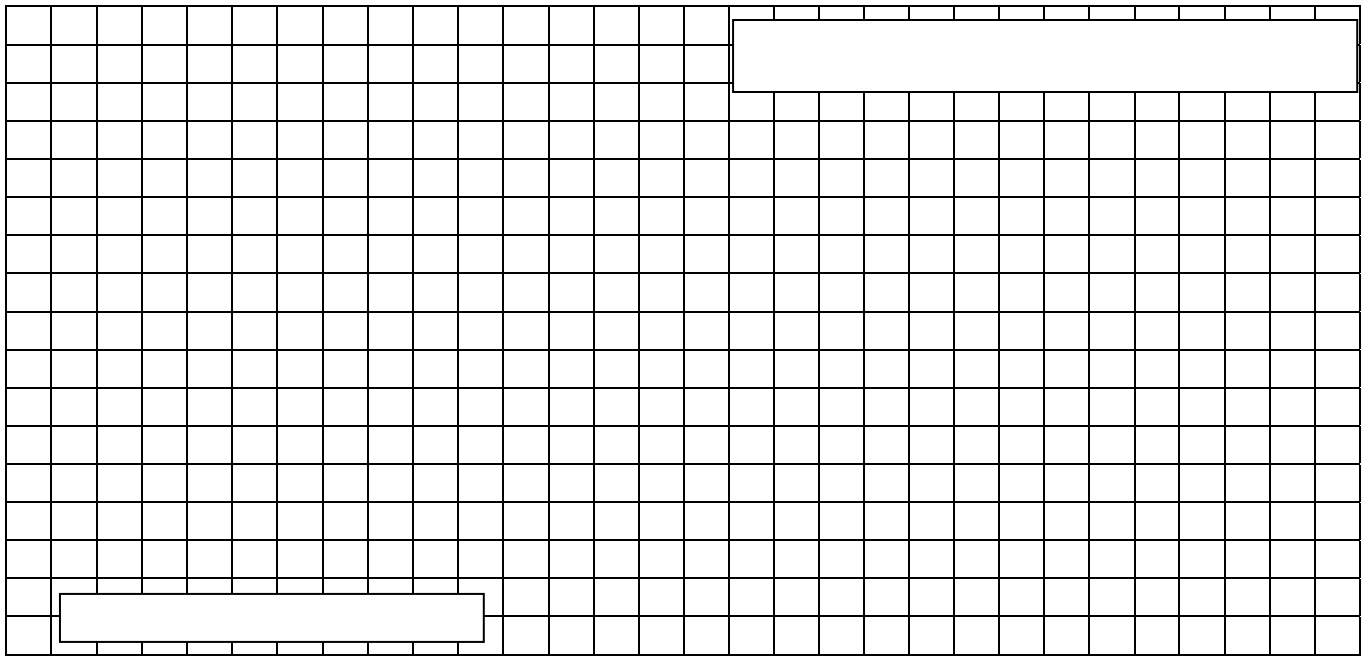
"Geo-Design": Finding Area of Rectangles and Squares

<u>Area</u>: Area is the number of square units needed to cover a surface or figure.

Area of a Rectangle  **W** **L**	**Area of a Square**  **S** **S**
Area of a rectangle = Length x Width **A = L x W**	**Area of a square = Length x Width** **<u>A = L x W</u>** **Area of a square = Side x Side** **A = S x S** **A = S^2**

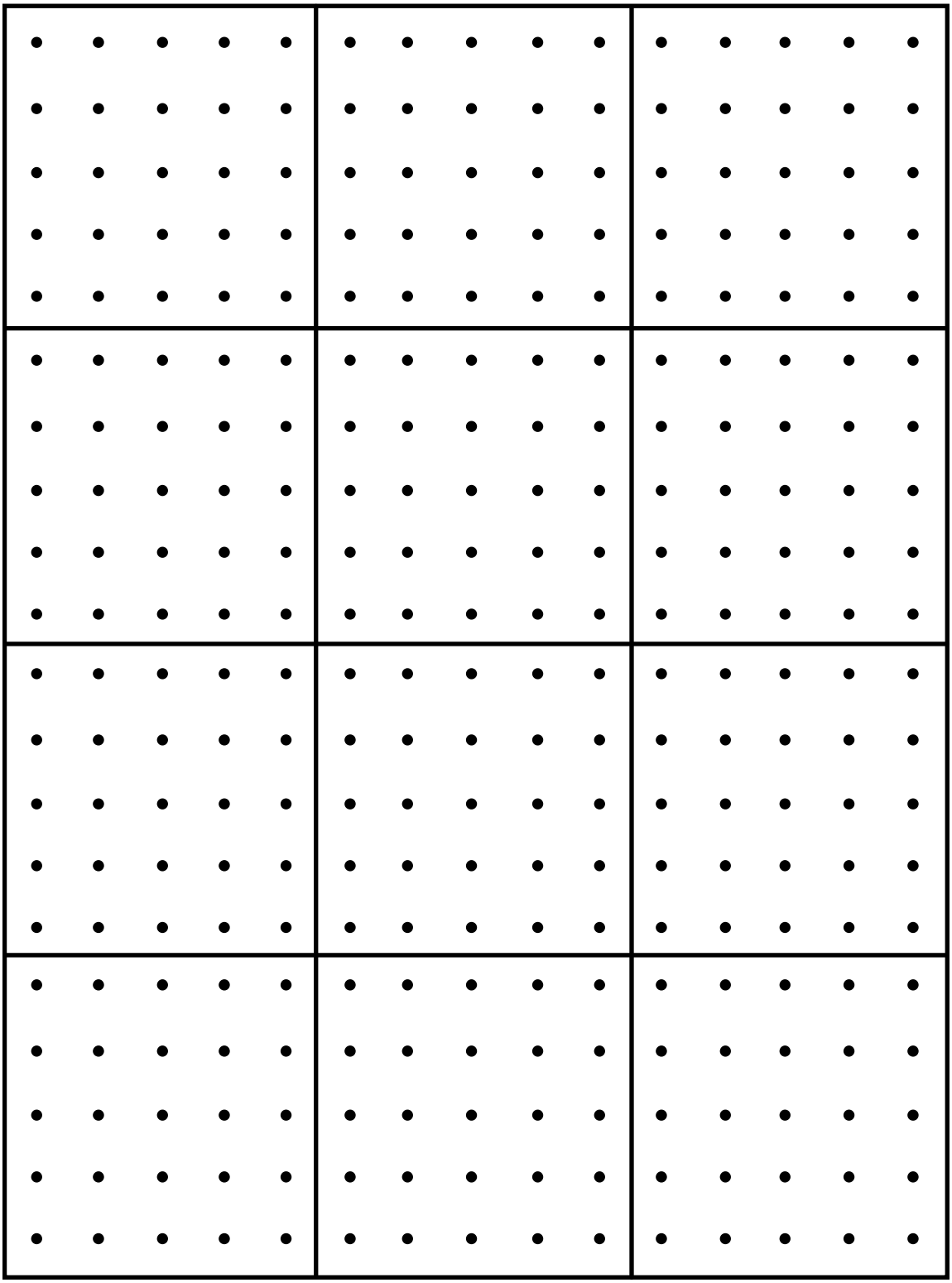
Directions: Using a ruler, draw a geo-design using only "squares and rectangles". Create a title for your drawing. Afterwards, find the area of your geo-design.





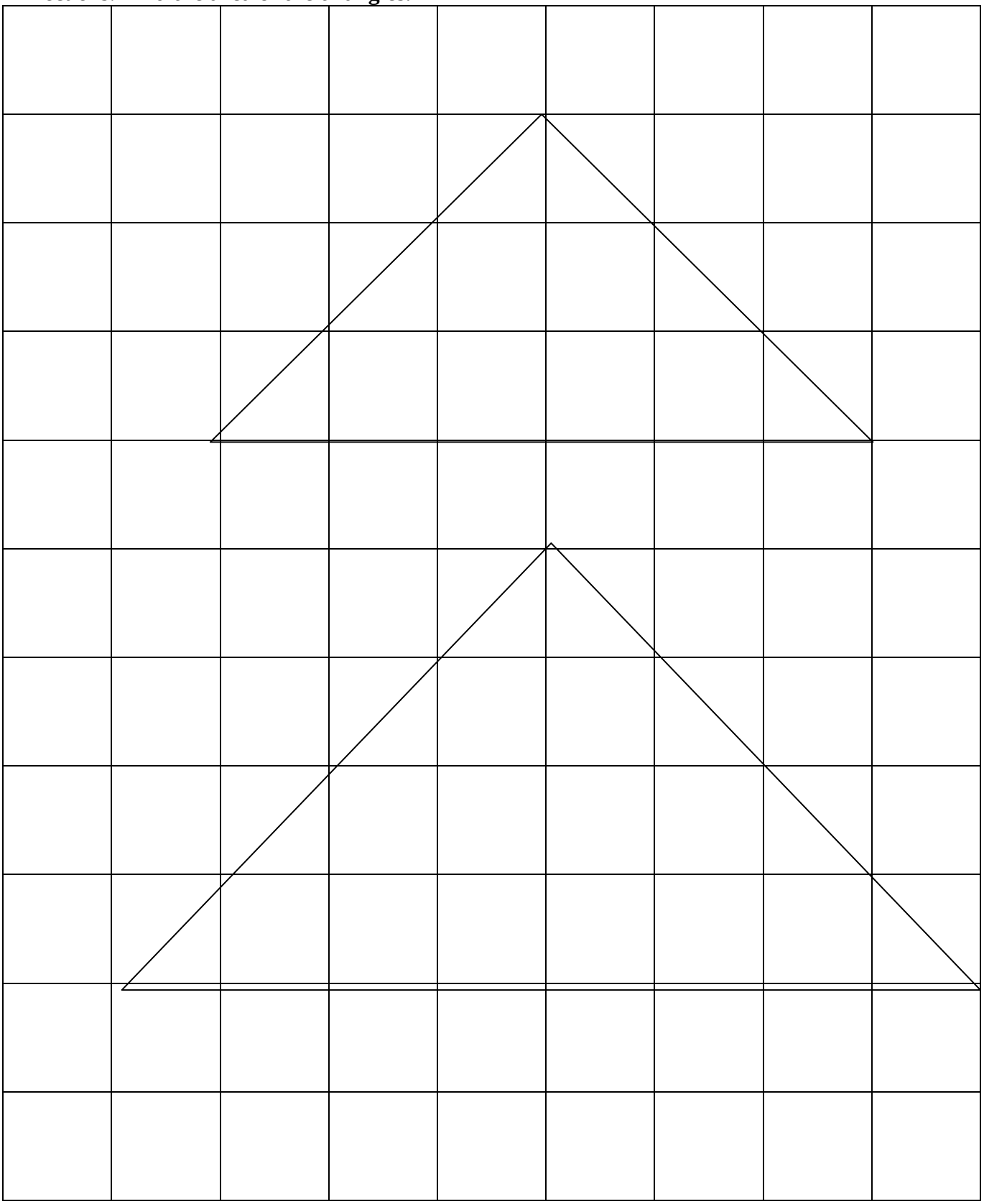
Geoboard Dot Paper

Name: ……..



Student Resource 7

Directions: **Find the area of the triangles.**



"Exploring Area of Right Triangles"

Width of the Rectangle (Units)	Length of the Rectangle (Units)	Area for the Rectangle (Units²)	Area for each Triangle (Units²)

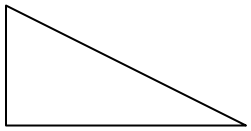
Name_____ Date_____

Teacher_____ Subject _____

"GeoDesign": Finding Area of a Triangle

<u>Area</u>: Area is the number of square units needed to cover a surface or figure.
<u>Triangle</u>: A polygon with three sides.

Area of a Triangle



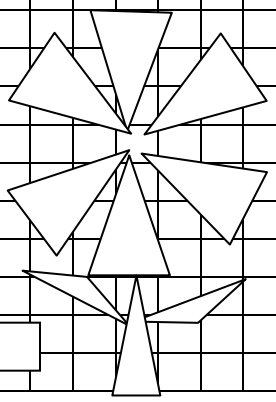
Formula:
Area of a Triangle = ½ x Base x Height

$$A = \frac{b \times h}{2}$$

Directions: Using a ruler, draw a GeoDesign using only "triangles". Create a title for your drawing. Afterwards, find the area of your GeoDesign. Keep it simple

Example

Title: "Flowers"

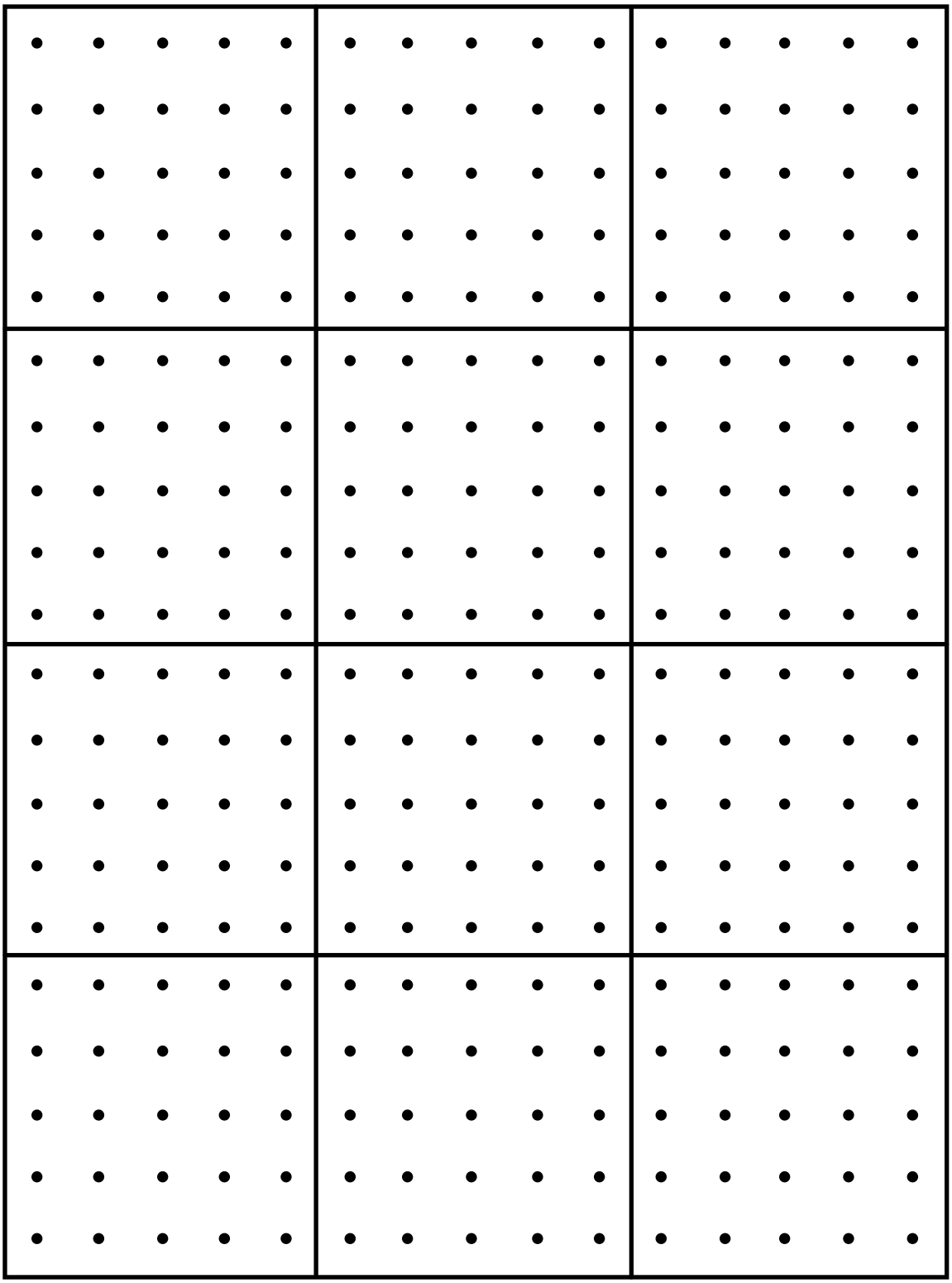


Area = _____

Area = _____

Geoboard Dot Paper

Name: ……..



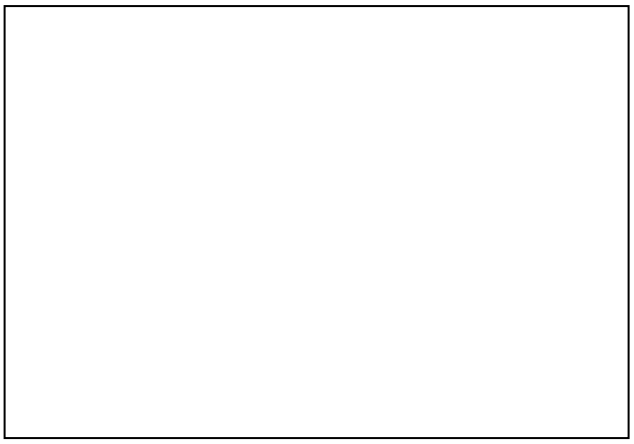
Name _____ **Date** _____

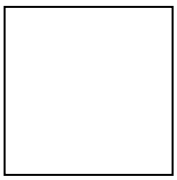
Teacher _____ **Subject** _____

Title: **Brief Constructed Response/Selective Response Perimeter and Area**

9 cm

6 cm





Each tile is 3 cm by 3 cm.

BCR
Step A: How many tiles can you fit into this space?

Step B**:** Use what you know about area to explain how you found your answer. Use words, symbols, or numbers in your answer.

_____

_____

_____

_____

_____

_____

_____

_____

1. **The height of a triangle is twice as great as its base. If the base is 8 m, what is the area of the triangle?**

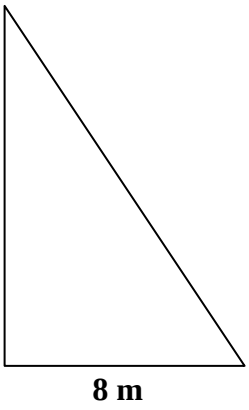
   A. 4 m^2

   B. 16 cm^2

   C. 64 m^2

   D. 16 m^2

   E. Not Here



2. **What is the perimeter of a backyard measuring 18 yd x 20 yd?**

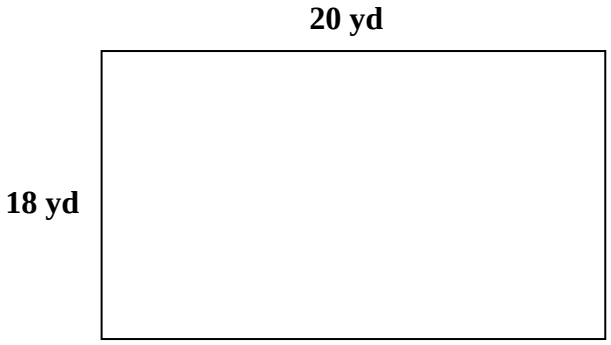
   A. 76 yd

   B. 38 yd

   C. 360 yd^2

   D. 58 yd

   E. Not Here



3. **What is the area of the closed figure?**

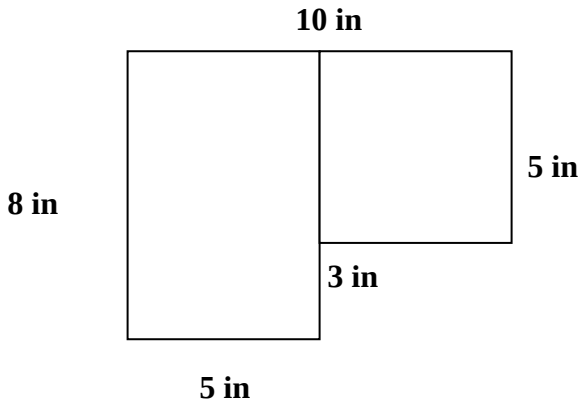
   A. 31 in

   B. 36 in

   C. 36 in^2

   D. 65 in^2

   E. Not Here



4. What is the perimeter of the whole figure?

A. 80 in

B. 150 in^2

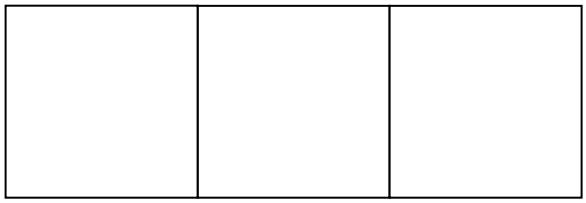
C. 50 in^2

D. 50 in

E. 70 in

F. Not Here

10 in



5. The area of the floor is 36 square units. What is the area of half of one floor tile?

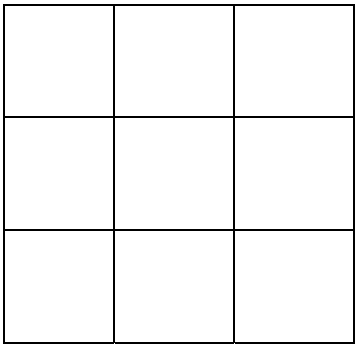
A. 24 units

B. 2 square units

C. 1 square unit

D. 6 units

E. Not Here



Formulas for Finding the Perimeter of Polygons

Item to be Measured	**Perimeter of a Square** *P = 4s or P = s + s + s + s*	**Perimeter of a Rectangle** *P = l + l + w+ w or P = 2l + 2w*	**Perimeter of a Polygon** *P = Sum of all sides*
1. Math Book		**P = 11+11+8.5+8.5 or P = 2(11) + 2(8.5)**	**93.5 in^2**
2. (Student Choice)	**(Answers will vary)**	**(Answers will vary)**	**(Answers will vary)**
3. (Student Choice)	**(Answers will vary)**	**(Answers will vary)**	**(Answers will vary)**
4. (Student Choice)	**(Answers will vary)**	**(Answers will vary)**	**(Answers will vary)**
5. (Student Choice)	**(Answers will vary)**	**(Answers will vary)**	**(Answers will vary)**
6. (Student Choice)	**(Answers will vary)**	**(Answers will vary)**	**(Answers will vary)**
7. (Student Choice)	**(Answers will vary)**	**(Answers will vary)**	**(Answers will vary)**
8. (Student Choice)	**(Answers will vary)**	**(Answers will vary)**	**(Answers will vary)**

Name_____ Date_____

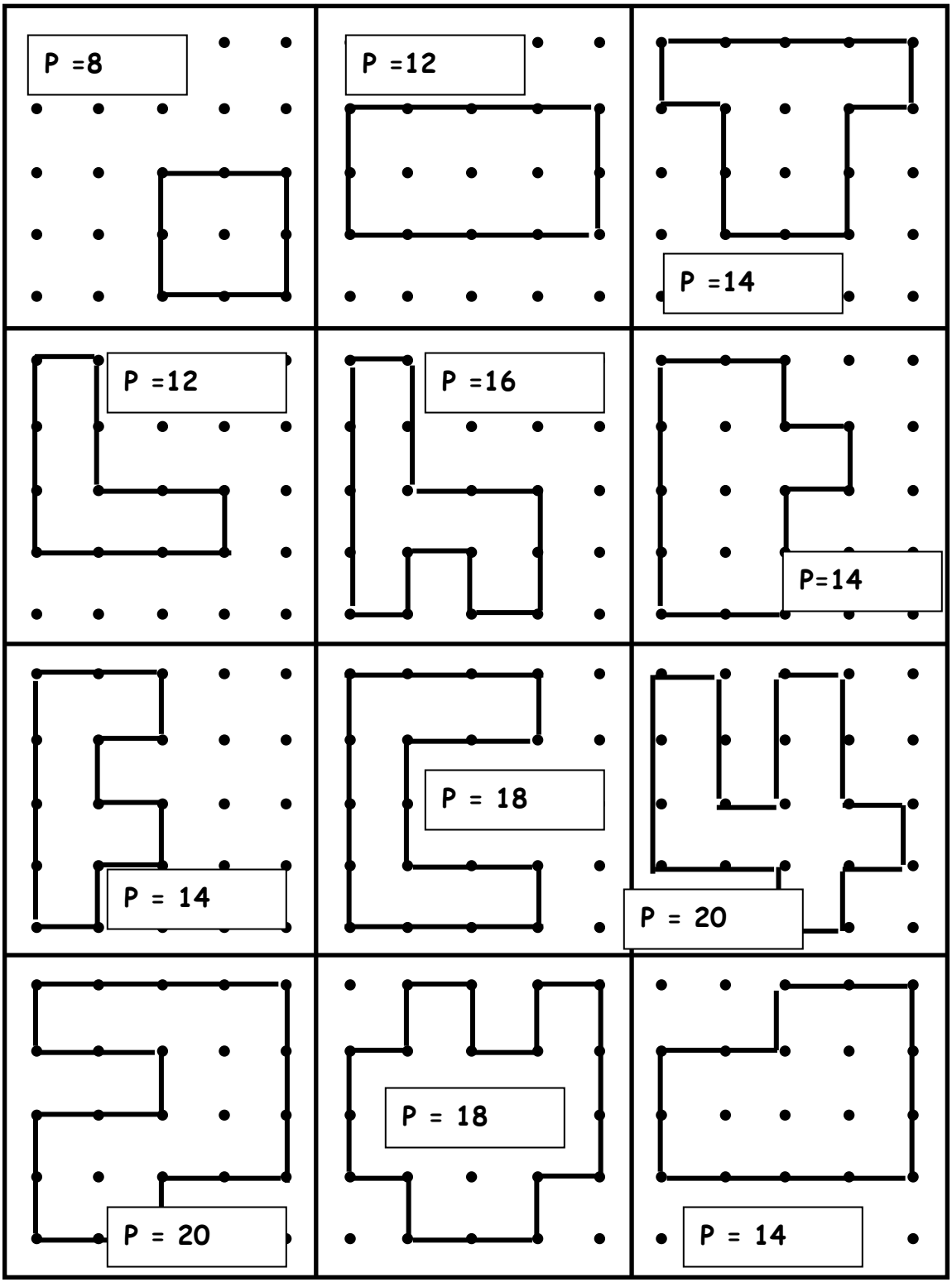
Teacher_____ Subject _____

Name_____ Date_____

Teacher_____ Subject _____

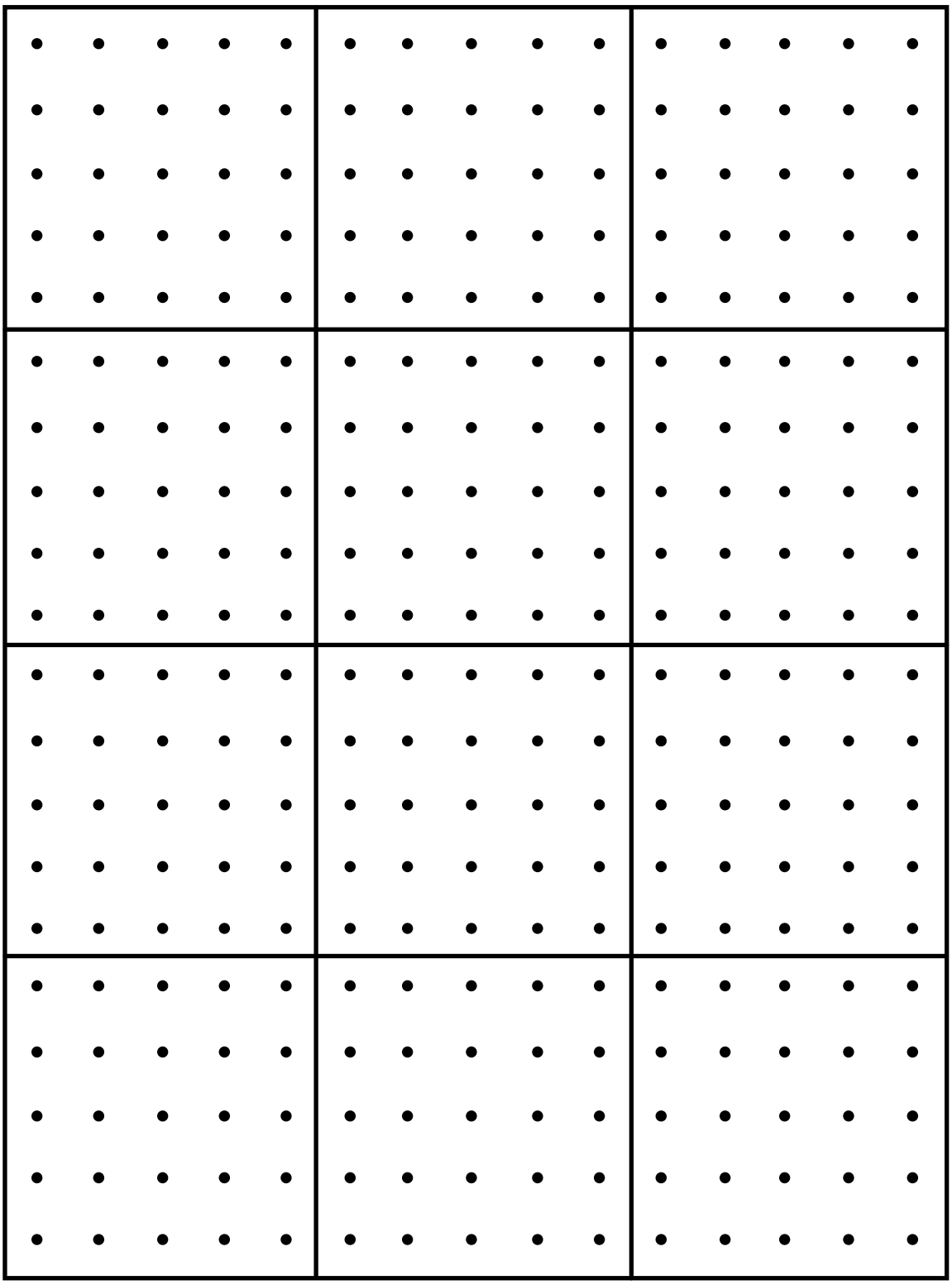
Assessment: Find the Perimeter

Directions: Find the perimeter of each polygon by labeling all sides and applying a formula.



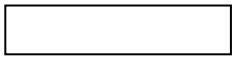
Geoboard Dot Paper

Name: ……..



"Geo-Design": Finding Area of Rectangles and Squares

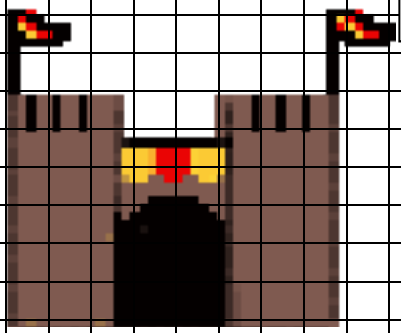
<u>Area</u>: Area is the number of square units needed to cover a surface or figure.

Area of a Rectangle 	**Area of a Square** 
w ***l***	***s*** ***s***
Area of a rectangle = Length x Width **A = *l* x *w***	**Area of a square = Length x Width** **A = *l* x *w*** **Area of a square = Side x Side** **A = *s* x *s*** **A = s^2**

Directions: Using a ruler, draw a geo-design using only "squares and rectangles". Create a title for your drawing. Afterwards, find the area of your geo-design.

Example

Title: "Medieval



Area = 40

Title:

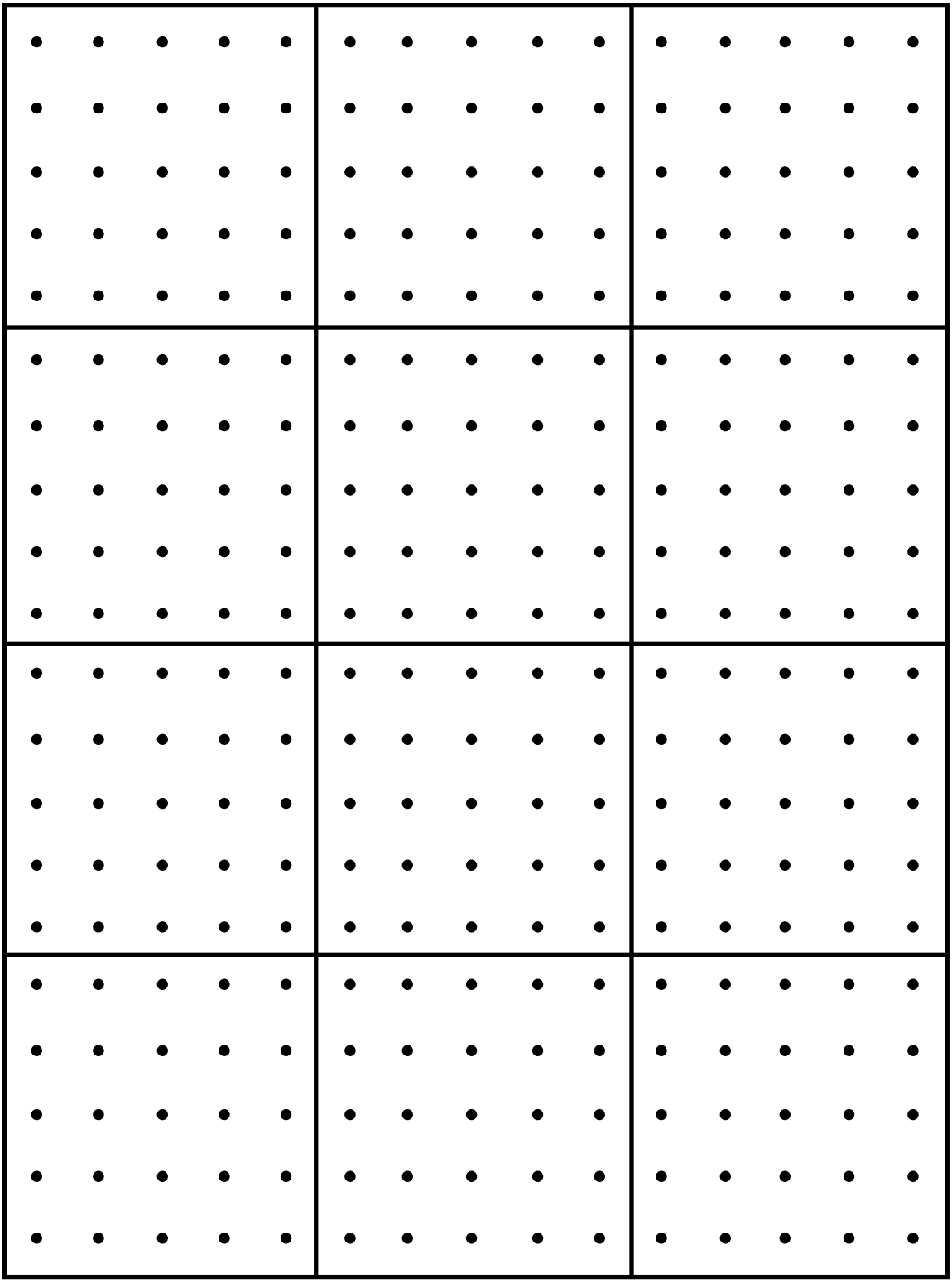
Student answers will vary.

Area = _____ Square Units

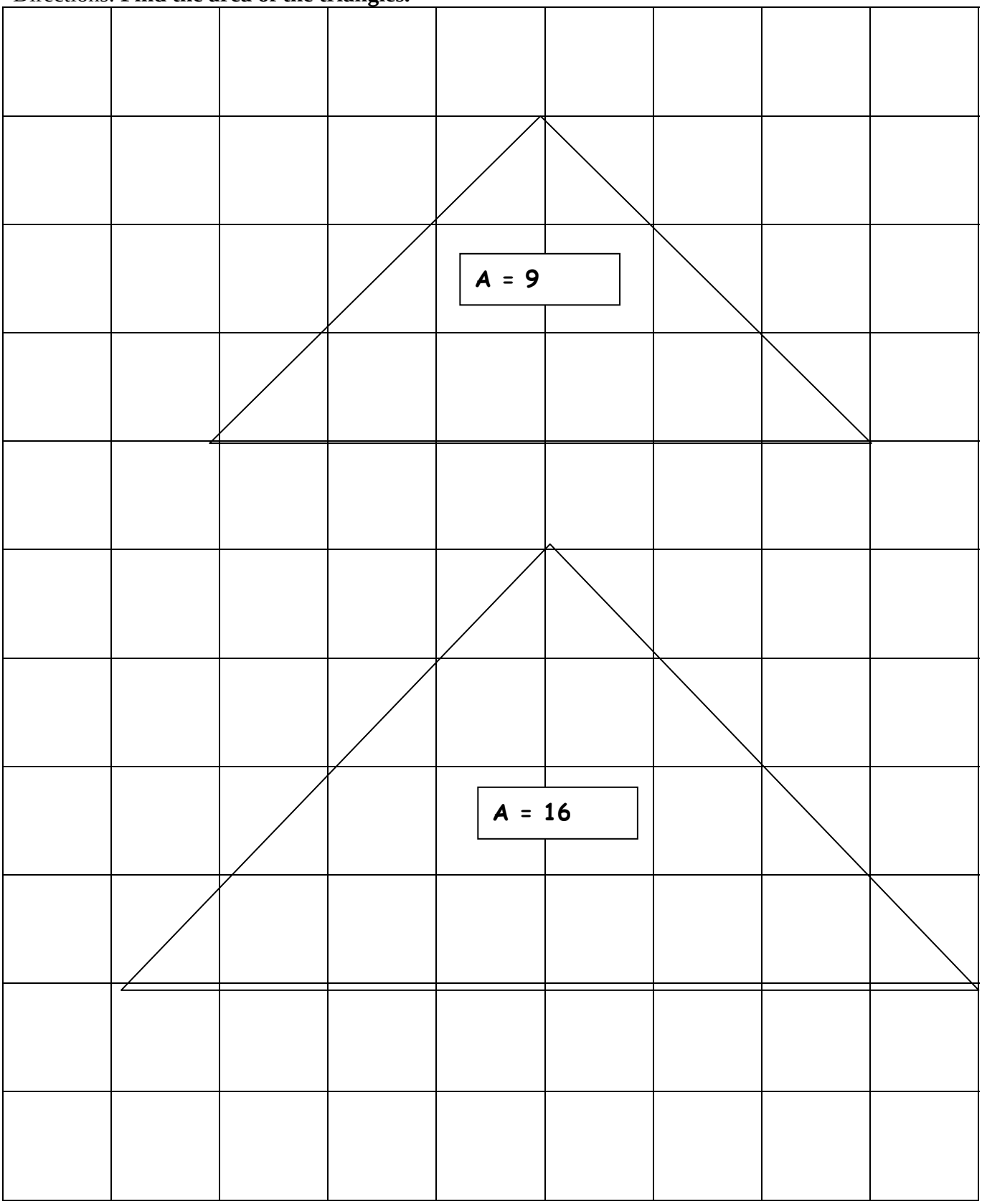
Teacher Resource 5

Geoboard Dot Paper

Name: ……..



Directions: **Find the area of the triangles.**



"Exploring Area of Right Triangles"

Width of the Rectangle (Units)	Length of the Rectangle (Units)	Area for the Rectangle (Units^2)	Area for each Triangle (Units^2)
(Student answers will vary)	**(Student answers will vary)**	**(Student answers will vary)**	**(Student answers will vary)**
(Student answers will vary)	**(Student answers will vary)**	**(Student answers will vary)**	**(Student answers will vary)**
(Student answers will vary)	**(Student answers will vary)**	**(Student answers will vary)**	**(Student answers will vary)**
(Student answers will vary)	**(Student answers will vary)**	**(Student answers will vary)**	**(Student answers will vary)**

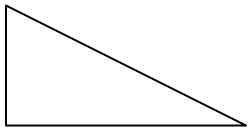
Name_____ Date_____

Teacher_____ Subject _____

"GeoDesign": Finding Area of a Triangle

<u>Area</u>: Area is the number of square units needed to cover a surface or figure.
<u>Triangle</u>: A polygon with three sides.

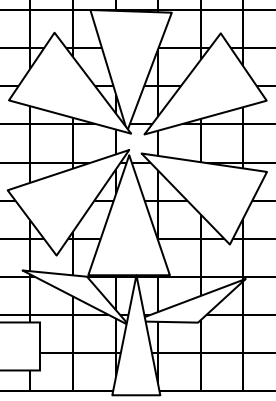
Area of a Triangle



Formula:
Area of a Triangle = ½ x Base x Height
$A = \frac{b \times h}{2}$

Directions: Using a ruler, draw a GeoDesign using only "triangles". Create a title for your drawing. Afterwards, find the area of your GeoDesign. Keep it simple.

Example



Title: "Flowers"

Area = _____

Title:

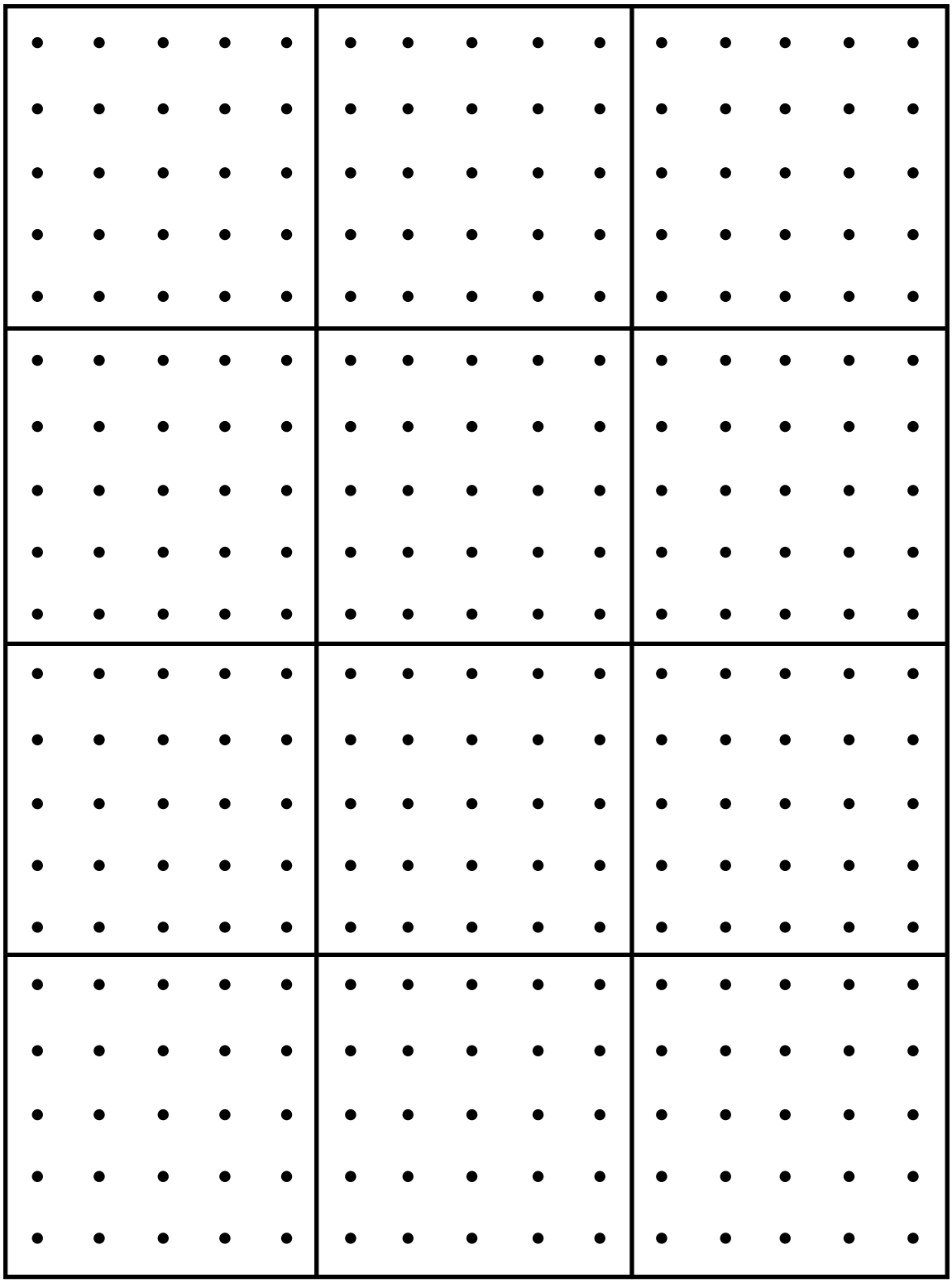
Student answers will vary.

Area = _____

Teacher Resource 11

Geoboard Dot Paper

Name: …….



Teacher Resource 12

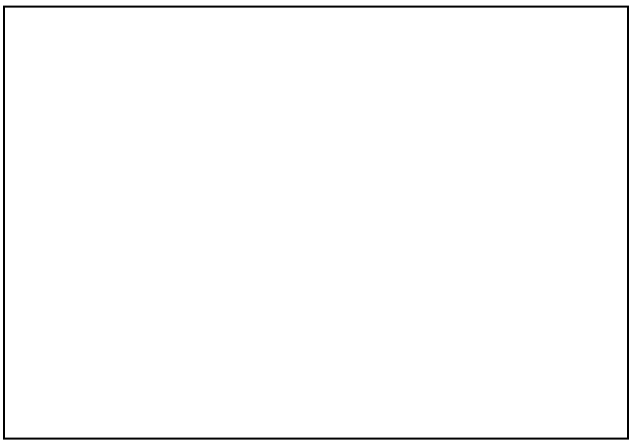
Name _____ Date _____

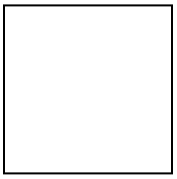
Teacher _____Subject _____

Title: Brief Constructed Response/Selective Response Perimeter and Area

9 cm

6 cm





Each tile is 3 cm by 3 cm.

BCR
Step A: How many tiles can you fit into this space?

6 tiles

Step B**:** Use what you know about area to explain how you found your answer. Use words, symbols, or numbers in your answer.

- *Area = length x width*
- *When I lay out my 3 by 3 tiles on the floor, I am able to place 3 tiles across and 2 tiles down. My length is 3 and my width is 2.*
- *I am able to put 6 tiles inside the space above.*

6. **The height of a triangle is twice as great as its base. If the base is 8 m, what is the area of the triangle?**

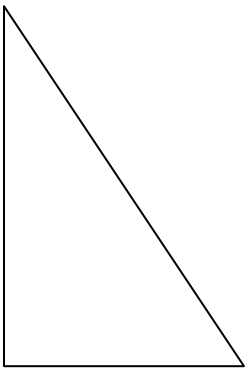
   A. 4 m^2

   B. 16 cm^2

   C. 64 m^2

   D. 16 m^2

   E. Not Here



7. **What is the perimeter of a backyard measuring 18 yd x 20 yd?**

   A. 76 yd

   B. 38 yd

   C. 360 yd^2

   D. 58 yd

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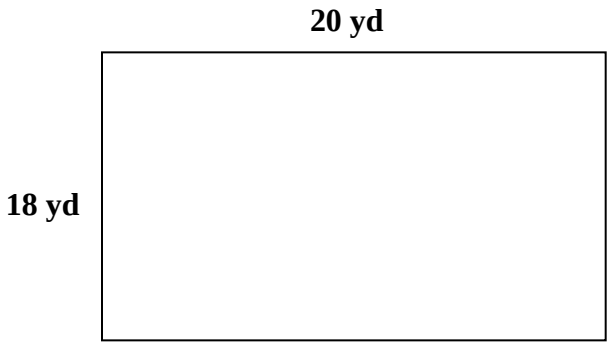


8. **What is the area of the closed figure?**

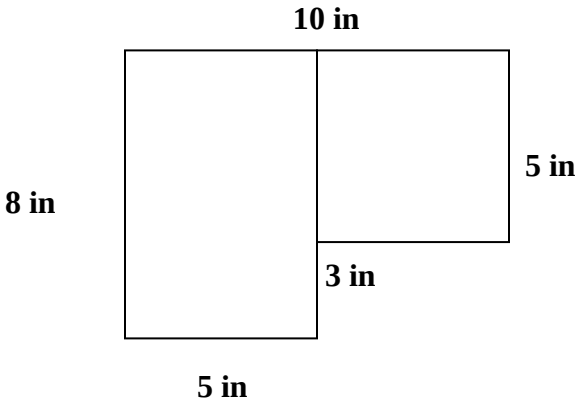
   A. 31 in

   B. 36 in

   C. 36 in^2

   D. 65 in^2

   E. Not Here



9. What is the perimeter of the whole figure?

A. 80 in

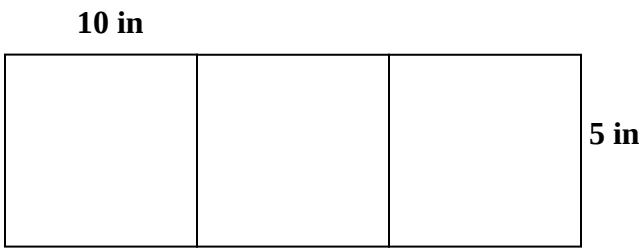
B. 150 in²

C. 50 in²

D. 50 in

E. 70 in

F. Not Here



10. The area of the floor is 36 square units. What is the area of half of one floor tile?

A. 24 units

B. 2 square units

C. 1 square unit

D. 6 units

E. Not Here